

Patent Claims

1. A method of determining the structural data of a prototype for a lightweight technical structure, comprising the method steps:
 - 5 1. preparing the relevant basic parameters of the technical light weight structure to be produced with respect to the technical problem;
 2. preselecting one or more bio-mineralized unicellular organisms with natural shell architectures suitable for the prepared parameters;
 3. selecting one or more fine structures of the preselected shell architectures most promising for a technical realization;
 - 10 4. directly copying the structural data from the selected fine structures;
 5. scaling the copied structural data to the basic parameters of the lightweight technical structure to be produced;
 - 15 6. combining and adapting the scaled structural data to a set of prototype data for a prototype for the lightweight technical structure to be produced; and
 7. optimizing the prototype.
- 20 2. The method of claim 1 including storing common descriptive properties of lightweight technical structures and shell architectures of bio-mineralized unicellular organisms as an organized collection of aspects and aspect values in a data base.
- 25 3. The method of claim 1 or 2 including storing a hierarchy of individual structural elements, greater subgroups and complete shell architectures of bio-mineralized unicellular organisms characterized by their known properties as an organized collection in a data base.
- 30 4. The method of one of claims 1 to 3 including direct copying of the structural data of the selected fine structures or substructures by at least semi-automatic scanning with a microscope.

5. The method of one of claims 1 to 4, including storing of the directly copies structural data as an organized collection in a data base.
6. The method of one of claims 1 to 5, including storing criteria for the scaling, the combining and the adapting of the structural data, of prototypes and their optimization results as an organized collection in a data base.
7. The practice of a method of determining structural data of a prototype for a lightweight technical structure, especially according to one of claims 1 to 6, for producing a prototype for a lightweight rim, characterized by the preselection of *arachnoidiscus* or *coscinodiscus* from the genera of diatoms as bio-mineralized unicellular organisms.
8. The practice of a method of determining structural data for a prototype for a lightweight technical structure, especially in accordance with one of claims 1 to 6, for producing a prototype for a lightweight building material, characterized by preselection of *phaeodaria* from the genera of radiolaria as bio-mineralized unicellular organisms.
9. A prototype for a lightweight rim (LF) for an automotive vehicle with an inner rim body (FK) mountable at one side to an axle and with an outer rim bed (FB) connected thereto, with the rim body (FK) being provided with a supporting spoke structure (SA) and produced by a method for determining the structural data of a prototype for a lightweight technical structure, especially according to one of claims 1 to 6, characterized by a highly symmetric formation of the spoke structure (SA) of a plurality of rib-like radial spokes (RAS) having a high aspect ration of width to depth and a plurality of annular spokes(RIS), with each of several radial spokes (RAS) extending from the rim bed (FB) over only one third of the rim body (FB) and terminating at an annular spoke (RIS).
10. The prototype of claim 9,

characterized by a lower aspect ratio of the annular spokes (RIS) relative to the aspect ration of the radial spokes (RAS), the annular spokes (RIS) extending flush or substantially flush with the radial spokes (RAS) at the front face.

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11. The prototype of claim 9 or 10, characterized by 16 radial spokes (RAS) and 6 annular spokes (RIS) every other radial spoke (RAS) extending from the rim bed (FB) to the second annular spoke (RIS) only.

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12. The prototype of one of claims 9 to 11, characterized by roundings (AB) between the radial spokes (RAS) in the direction of the rim bed (FB).

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13. The prototype of one of claims 9 to 12, characterized by a concentric circular disc (KP) in the section of the axle mount of the rim body (FK) and into which the radial spokes (RAS) extend.

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